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**INTERLEUKIN-3 (IL-3) MULTIPLE MUTATION POLYPEPTIDES**

**ABSTRACT**

5           The present invention relates to recombinant  
human interleukin-3 (hIL-3) variant or mutant proteins  
(muteins). These hIL-3 muteins contain amino acid  
substitutions and may also have amino acid deletions at  
both the N- and C- termini. The invention also relates  
10 to pharmaceutical compositions containing the hIL-3  
muteins and methods for using them. Additionally, the  
present invention relates to recombinant expression  
vectors comprising nucleotide sequences encoding the hIL-  
3 muteins, related microbial expression systems, and  
15 processes for making the hIL-3 muteins using the  
microbial expression systems.

          Included in the present invention are deletion  
mutants of hIL-3 in which from 1 to 14 amino acids have  
20 been deleted from the N-terminus, and from 1 to 15 amino  
acids 119 to 133 have been deleted from the C-terminus,  
and which also contain amino acid substitutions in the  
polypeptide. These hIL-3 multiple mutation polypeptides  
may have biological activities similar to or better than  
25 hIL-3 and, in some cases, may also have an improved side  
effect profile.